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Archiving Framework: A hybrid of Internal Server-base and Cloud-base Digital System for Ministries

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ABSTRACT
A proper digital archiving system especially for the Land and Survey Ministry has many benefits that should be explored with concerted effort aimed at efficiency in data management and effectiveness in easily carrying out new policies of governance. Proper digital archiving has many multifaceted benefits a few of which was outlined and briefly discussed. This paper highlights the two approaches in archiving digital documents which were the internal sever-base and cloud-server. These two approaches have their shortcomings of limiting the accessibility of data and information. Thus, this study therefore captures the potentials of the two approaches and creating an improved framework.
Keywords: Archiving, Server-base, Cloud-base, Framework, Digital

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I. INTRODUCTION

One of the important issues facing top management in the digital age is the long-term preservation and management of digital information to support organizational sustainability, accountability and decision-making effectiveness. With information being the support of any organization, it is essential to develop and implement strategies to ensure that information remains accessible for as long as required. The world is fast changing and in more developed and advanced countries, conscious inroads are made to ensure that relevant information are properly archived in such a manner that they are easily retrieved. Important information should be repository in the long term and its integrity and authenticity is maintained. Ministries, particularly Land and Survey ministry is where land disputes, multiple sales of land and other fraudulent transactions are ever an issue. In Nigeria, these issues are prevalent and often lead to individual and communal clashes that could be averted with the presence of a robust, reliable and consistent archiving of land and survey data (Harris and Olby, 2001).

As is with most states in Nigeria, land and survey data are not digitally archived but are stored in offices, store rooms and drivers (flash drives and CD ROMs) where they are exposed to moisture and can easily be damaged by accidents such as fire. Damage to these documents can also be deliberate in which case, sabotage or falsification of document or information may emerge. A compromise of these documents not only questions the authenticity of the room-stored document but also questions the method of document storage. The foregoing challenges no doubt warrants a novel and necessary approach that will curb the web of document falsification, guarantee document authenticity and provide a means of document storage in a location, secured where documents cannot be destroyed easily.

A comparative analysis of both developed and developing countries with respect to information or data management, seem to indicate that the developed countries manage their data more securely than they practice in developing countries. In developed world, not only is there in existence real-time and easily accessible land and survey data used for regional planning, there also exist archives of data from earth observation satellites (Harris and Olby, 2001). These data are used to monitor the changes in the earth due to human activities with an objective to safeguard and preserve the earth for future generations. The above mentioned thus give credence to the statement that developing countries such as Nigeria are lagging in proper management of data especially in the land and survey industry.

A proper digital archiving system especially for the Land and Survey Ministry has many benefits that should be explored with concerted effort aimed at efficiency in data management and effectiveness in easily carrying out new policies of government. Proper digital archiving has many multifaceted benefits a few of which will be outlined and briefly discussed.

The importance of land and survey data cannot be overemphasised as its benefits cuts across a wide spectrum of social lives and breathes freshness, order and stability into the society. Amongst other functions of Ministry of Land and survey according to Moore (2015) are; determining and verifying of boundaries of properties through land measurement or surveying techniques and equipment; Planning the development of lands; Conducting legal research of boundaries of properties with the aid of public records deed, legal record and maps; and Investigating easement or encroachment on boundaries of properties etc.

It can be inferred from these functions, that successful operation of a land survey ministry is hinged on how data is generated, research information and regional plans are properly documented, stored and properly curated. In addition, they should be easily accessible for intellectual or historical purpose for a long period of time yet maintaining their usefulness and authenticity.

With paper prints, it is actually possible to achieve these functions but not without the expensive cost of time, money and space and the grace of non-occurrence of uncertainties. These uncertainties include but not limited to burglaries, fire accidents, flooding and destruction of store houses containing these very significant documents. In the event of these uncertainties, these documents may most likely be lost and irretrievable especially when there are no other copies.

In the performance of task of the ministry, the search for a document in a store can be very laborious thus, consumes time, energy and money to locate the searched-for document. Performing this task repeatedly overtime can be frustrating especially when a particular staff is tasked with such responsibility. It is quite apparent that this pattern of documentation is bereft of efficiency and effectiveness and therefore demands a novel and more productive way of data documentation.

El-Rufai (2013) noted that the problem of land management in FCT was the total reliance on paper prints records. He further espoused that the reliance makes the records susceptible to manipulation and forgery that can give rise to unlawful possession of Certificates of Occupancy (C of O) and that 80% of applications for right of occupancy were left unattended to. This indeed necessitated the digitizing of land data resulting in stimulated efficiency and productivity of administration, documentation and planning in the FCT.

Caroline (2006) opined that designing digital archiving system are of two approaches; either internal server-based or cloud computing. The internal database management system entails storing digitized archives on internal servers where information can be easily accessed from the server if the need arise. But its limitation is information is inaccessible outside the organization, so also if anything happens to the internal server there may not be strong backup to fall back on.

On the other hand, in cloud computing approach, digitized information and other resources is stored on the cloud. Users use the internet to access information, the drawback of such a system is everything comes to a halt the moment the network is down.

Users of any of these approaches therefore will not find such design as working as expected. Thus, there is need to design an improved system that will synergise the internal sever-base and the cloud computing system into a hybrid system. This is the focus of the study.

1.1 Archiving in Nigeria

Ministries of Land and Survey are currently using a traditional method of archiving system. Important documents such as land deeds, Certificates of Occupancy, employees‟ records and other vital documents are stored in offices and stores. Filling cabinets and drawers are crammed with files and papers. With paper prints, activities are possible but not without the expensive expenses of time, money and space and the grace of non-occurrence of uncertainties. These uncertainties include but not limited to burglaries, fire accidents, flooding and destruction of store houses containing these very significant documents. In the event of these uncertainties, these documents may most likely be lost and irretrievable especially when there are no other copies.

In the performance of the ministry, the search for a document in a store is observed to be a laborious thus, costing time, energy and money to locate the searched-for document. Performing this task repeatedly overtime is a tedious and frustrating experience especially when a particular staff is tasked with such responsibility repeatedly. It is quite apparent then and rightly so that this pattern of documentation is bereft of efficiency and effectiveness and therefore requires an improved productive way of data documentation. The approaches in digital archiving are the internal sever-base and cloud-server. These two approaches have their shortcomings of limiting the accessibility of data and information. In internal server-base digital archiving, information is only accessible from systems connected to the server. In cloud-based system, information is only accessible with the help of the internet.

Thus, this framework of digital archiving combines the potentials of both the internal-server and cloud-base.

1.2 Digital Archiving and its Challenges over the Years

Digital archiving can be said to be a long-term storage, preservation and access to information that is primarily created and disseminated in an electronic form or that has the digital version as the primary archive (Hodge, 2000). A digitally archived data is a logical object stored in a physical medium (Steenbakkers, 2005).The task to guarantee continued access to digitally stored data indefinitely into the future has been the challenge of archivist since the digital age. The reason for this is not difficult to see. Digital technology, both hardware and software, is fast growing at an ever-increasing pace. Steenbakkers(2005) wrote that in the 1960ʺs alone, more than 200 digital storage formats have been deployed yet none lasted more than 10 years. This implies that Archivists at the time needed to keep pace with the development so that stored data would not go into obsolescence. To do this required that they had software and hardware with state-of-the-art functionality for accessing and reading digitally stored information. This requirement compelled the need for a consistent or harmonious methodology globally. The treat to digital information was viewed as two fold (Steenbakkers, 2005). Firstly, the physical carrier will deteriorate in that the technology with which the information is stored is more likely to become obsolete in the fullness of time. Secondly, that the digital information contained in the digital object cannot be interpreted, displayed nor used as the necessary functionality to perform these operations will no longer be available with respect to time and development of digital technology. Thus, even with the preservation of the digital information (bitstream) of the digital object, with the passage of time there will be no functional hardware and software to interpret, display and used it(Steenbakkers, 2005).

These threats were recognised by(Rothenberg, 1995) who in his work identified few very important digital information that were nearly lost such as the 1960 U.S. Census data and Department of Health and Human services data which were stored on tapes that became obsolete faster than expected. The ability to prevent these threats thus implies successful preservation of digital information otherwise all digitally archived resources would be lost and paper print would be the preferred option. As a result, various solutions were proposed to ensure permanent access to digitally archived data. These methods include migration or conversion, normalisation and emulation and the selection of which method to adopt is dependent on the nature (format) of the digitally archived data or the intended use (processing or viewing) of the information by the user. These techniques were chiefly adopted to mitigate obsolescence of digitally archived information.

i. Migration or Conversion: This method makes changes to the original data stored in the archive. The change could be as worse as a total loss of the sored data.
ii. Normalisation: This method involves the conversion of the stored data to a predetermined format. This is a prerequisite before being archived and implies that some loss of information can be accommodated.
iii. Emulation: This technique essentially tries to preserve the authenticity of an archived data through the use of emulators. Emulators are programs that mimic the behaviour of a hardware. The use of emulators was proposed as a more suitable technique to prevent obsolescence as other techniques had flaws that mostly led to changes or total loss of stored information(Rothenberg, 1995).

A combination of emulation and controlled migration for optimum results was developed by Universal Virtual Computer and used by KoninklijkeBibliotheec (KB)- (is the national library of the Netherlands founded in 1798 and located in the Hague)and IBM - International Business Machines - incorporated on June 16, 1911 as Computing-Tabulating-Recording Company. However, its origins can be traced back to late 1880ʺs through the invention of the first dial recorder by Dr. Alexander Dey(IBM Corporation) for the purpose of providing permanent archiving solutions (Steenbakkers, 2005). These methods usually carry huge operational cost thereby necessitating the selection of essential materials to be preserved (Haynes, Streatfield, Jowett, and Blake, 1997). This raises the question- what qualifies a material to be worth preserving and who should be responsible for preserving it?

1.3 Digital Archiving in the Cloud

There are in existence various means of data storage nowadays. Digital data can be stored on computers and with the growth of the size of the data, larger internal storage in form of larger hard drives can be an option. For external storage, Compact Discs (CD) is a more traditional option. However, there comes the challenge when acquired digital data for an organisation or even on a personal ground is too large that new information cannot be stored. In this case, the capacity of the storage has been exhausted and deleting of old

folders may be the chosen option. The growing demand for storage space for the ever-increasing digital data has thus led to the choice of storing data in the "cloud". Migration to the cloud storage is growing trend and many organization will move to Cloud archiving solutions (Hewlett Packard, 2014).

Cloud storage essentially means saving of digital data in an off-site storage system maintained and managed by a third party. This means that instead of ones data to be stored locally, it is stored in a place accessible via the internet thus eliminating the need for a portable physical storage device. This technology allows for the stored data to be accessed by others but subject to the permission of the data owner (Strickland, 2015).

There are many third party companies that offer digital archiving solutions in the cloud. A few of them are HP information archiving (Hewlett-Packard, 2014), Google Docs, Yahoo and Gmails, YouTube, MySpace, Facebook, and Dropbox. Despite the advantages of cloud storage, there are two basic challenges-reliability and security. This has prompted the use of various means and levels of security to ensure that the integrity of cloud-stored data is safe and secure. Encryption using complex algorithms, authentication and authorisation are practices to secure cloud-archived data.

1.4 Internal Server systems

This is a system were all digitized data is lodged. It manages and controls the flow of data and information within a limited location. Depending on the size of the archive needed, the storage capacity and numbers of HDDs can be regulated. They can all be connected to each other as a unified storage system and linked to servers and individual computers of a whole institution. This allows for quick access and backup, also for HDD stored on other locations. It‟s possible, and for some institutions enough, to have a 'bunch' of individual disks that needs to be maintained separately, but they all have to be individually connected to a server. To make this easier they can be put together in a so-called JBoD (Just a Bunch of Disks), which means that the individual disks are put together at one connection point. This can lead to slow access if several disks are activated at the same time, or if one disk fails, and there is no automatic backup of the data on that specific disk. So for larger collections and for safety reasons a RAID (Redundant Array of Independent Disks) which is Redundant Array of Independent Disks, originally Redundant Array of Inexpensive Disks, is a storage technology that combines multiple disk drive components into a logical unit. Data is distributed across the drives in one of several ways called "RAID levels" is recommended. This is a system that brings together a number of hard disks to form one virtual hard disk (Troppens 2009). Data is distributed across the drives in one of several ways called "RAID levels", but the server sees it as one big disk. RAID systems are faster and more fault-tolerant than individual physical hard disks because if a HDD fails it can be exchanged without data being lost. The data can be reconstructed with the help of the other disks, because it is distributed and connected between the disks. How this is built up depends on the level of RAID.

There also exists a system called Massive Array of Idle Disks (MAID), a storage technology like RAID but with energy management. MAID turns the HDDs off to save energy as soon as the content on the disks is not in use. It has also been said that a MAID could increase the life expectancy of the HDDs, because they would not spin constantly. However, Google published an article in 2007 saying that the usage and higher temperature of a HDD does not seem to correlate with the disk failure rate, making this argument less reasonable (Pinheiro 2007). Most institutes go for a RAID setup, although there could be beneficial energy savings using a MAID system.

In terms of which RAID level is suitable for long-term storage, it is important to focus on the level that provides the highest fault tolerance and lowest risk of data loss, and then on its overall performance and speed (Troppens, 2009)

II. RELATED WORK

2.1 Land and Survey Data as a Document

A paper document can be easily identified because it is on paper. A digital document deals with a technological medium but cannot be simply defined. This difficulty is probably linked to what a document really constitutes. The definition of the "what a document is" has been debated for over centuries. The increased number of scientific and technical literatures published in the 19th century, led to the need for new technique to effectively manage the emergence of these copious amount of documents. In other words, techniques were sought on how to efficiently and reliably collect, preserve, organise, describe, retrieve, reproduce and disseminate documents. This technique was called "bibliography". However, "documentation" was adopted as a replacement for the name in the late 20th century in Europe. Although with printed texts this technique worked, it was not sufficient for signifying objects since documentation does not constitute texts alone (Buckland, 1997).

Paul (1934) wrote that Graphic and written records represent ideas or of objects but objects can be regarded as documents if one is

informed by observing them (Buckland, 1997). Thus a document is defined by the function it performs. Any physical or symbolic sign, preserved or recorded, intended to reconstruct, or to demonstrate a physical or conceptual phenomenon is a document. This implies that a tree in the forest is not a document but a photograph of it would be; an artefact is not a document but one exhibited in a museum is. In the same line of thought, land data archived for information and planning purposes is a document whether digital or printed on paper.

2.2 Benefits of Digital Archiving of land and Survey Data

The digitizing of land and survey data would require that most of the ministry‟s data are created, stored and managed digitally. This implies that where possible, paper records are digitised such that new paper prints and files are not created. Most information now created are often created in digital form and may amount to wasteful spending to convert them to paper print to be stored in file and stacked in a store room. Dwelling on paper prints in these times is increasingly unrealistic and by extension suppresses innovation. It is thus beneficial to digitise and digitally archive land and survey data. A few benefits of digital archiving of land and survey data are listed below.

a. It provides a reliable database required for Urban and Rural planning and engenders improved information sharing across the ministry and between other ministries.
b. It improves operations and faster access to and retrieval of information.
c. It guarantees the significant reduction of time spent by staff to search for document thus freeing up time for staff to perform core functions (National Archives of Australia).
d. It can function as anup-to-date database for planned routing by any engineering enterprise (public and/or private) of utilities across inter and intra regions.
e. It can provide data required for preparation of Title Deeds Plan (TDP) with quicker access to the right information.
f. A veritable tool for the efficient and effective document control to prevent encroachment with accuracy and transparency in the shortest possible time.
g. To preserve the authenticity of land and survey data beyond uncertainties as defined in the “statement of the problem” section above.
h. To facilitate and make less laborious legal research documentation of public records, deeds, legal records and maps and thus better service delivery.
i. It will enhance the performance of the ministry by making it responsive to changes and take advantage of new technologies (National Archives of Australia).
j. It provides cost savings as creation, storage, retrieval and handling of paper print is reduced. The cost of stationeries such as paper, file jackets, labels, and printer cartridges is reduced (National Archives of Australia).
k. It ultimately preserves the archived data for public good even if the public may not shoulder the cost of preservation (Lavoie and Dempsey, 2004).

2.3 Standards for a digital archive

Gatenby (2006) viewed that a successful digital archive requires an integrated framework of policy and standards to underpin its operations and support whatever technology options are adopted. A range of standards have emerged in recent years that provide guidance on the essential elements and functionality of a digital archive. Two key standards include:

i. Open archival information system(Reference model): The Open Archival Information System (OAIS) reference model is a conceptual model that outlines how digital objects can be prepared, submitted to an archive, stored, managed and maintained for long periods, and retrieved as needed, although it does not prescribe any technical approach to preservation.
ii. Trustworthy Repositories Audit and Certification (Criteria Checklist): The Trusted Repositories Audit and Certification (TRAC) framework provides tools for the audit, assessment, and potential certification of digital archives, establishes the documentation required for audit, delineates a process for certification, and establishes appropriate methodologies for determining the soundness and sustainability of digital archives. It is widely recognized as a defacto standard within the digital preservation community and work is currently underway to transform this framework into a formal international standard.

2.4 Reference Model for an OAIS

The purpose of this section is to define the Reference Model for OAIS. An OAIS is an Archive, which consist of an organization, which may be part of a larger organization, of people and systems that has accepted the responsibility to preserve information and make it available for a Designated Community. It meets a set of such responsibilities that allows an OAIS Archive to be distinguished from other uses of the term „archive‟. The information being maintained has been deemed to need long term preservation, even if the OAIS itself is not permanent. Long term is long enough to

be concerned with the impacts of changing technologies, including support for new media and data formats, or with a changing user community. Long term may extend indefinitely. In this reference model there is a particular focus on digital information, both as the primary forms of information held and as supporting information for both digitally and physically archived materials (Alex, 2006).

Therefore, the model accommodates information that is inherently non-digital (e.g., a physical sample). This reference model:

i. provides a framework for the understanding and increased awareness of archival concepts needed for long term digital information preservation and access;
ii. provides the concepts needed by non-archival organizations to be effective participants in the preservation process;
iii. provides a framework, including terminology and concepts, for describing and comparing architectures and operations of existing and future Archives;
iv. provides a framework for describing and comparing different Long term

Preservation strategies and techniques;

v. provides a basis for comparing the data models of digital information preserved by Archives and for discussing how data models and the underlying information may change over time;
vi. provides a framework that may be expanded by other efforts to cover Long term

Preservation of information that is NOT in digital form (e.g., physical media and physical samples);

vii. expands consensus on the elements and processes for Long term digital information preservation and access, and promotes a larger market which vendors can support;
viii. guides the identification and production of OAIS-related standards.

Alex (2006) opines that the reference model addresses a full range of archival information preservation functions including ingest, archival storage, data management, access, and dissemination. It also addresses the migration of digital information to new media and forms, the data models used to represent the information, the role of software in information preservation, and the exchange of digital information among Archives. It identifies both internal and external interfaces to the Archive functions, and it identifies a number of high-level services at these interfaces. It provides various illustrative examples and some „best practice" recommendations. It defines a minimal set of responsibilities for an Archive to be called an OAIS, and it also defines a maximal Archive to provide a broad set of useful terms and concepts.

The OAIS model may be applicable to any Archive. It is specifically applicable to organizations with the responsibility of making information available for the long term. This includes organizations with other responsibilities, such as processing and distribution in response to programmatic needs.

This model is also of interest to those organizations and individuals who create information that may need Long term Preservation and those that may need to acquire information from such Archives.

The model, including the functional and information modelling concepts, is relevant to the comparison and design of facilities which hold information, on a temporary basis, for two reasons:

i. When taking into consideration the rapid pace of technology changes or possible changes in a Designated Community, there is the likelihood that facilities, thought to be holding information on a temporary basis, will in fact find that some or much of their information holdings will need Long term Preservation attention.
ii. Although some facilities holding information may themselves be temporary, some or all of their information may need to be preserved indefinitely. Such facilities need to be active participants in the Long term Preservation effort.

Standards developers are expected to use this model as a basis for further standardization in this area. A large number of related standards are possible.

A major purpose of this reference model is to facilitate a much wider understanding of what is required to preserve and access information for the Long term. To avoid confusion with simple „bit storage" functions, the reference model defines an Open Archival Information System (OAIS) which performs a Long term information preservation and access function.

The OAIS model recognizes the already highly distributed nature of digital information holdings and the need for local implementations of effective policies and procedures supporting information preservation. This allows, in principle, a wide variety of organizational arrangements, including various roles for traditional Archives, in achieving this preservation.

It is expected that organizations attempting to preserve information will find that using OAIS terms and concepts will assist them in achieving their information preservation goals.

2.6 OAIS Environment

The simple model shown in figure 2 depicts the environment surrounding an OAIS.

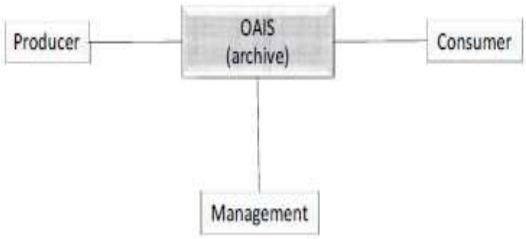

Figure 2.6.1: Environment Model of an OAIS
Source: Consultative Committee for Space Data Systems (CCSDS) (2012)

Outside the OAIS are Producers, Consumers, and Management, the CCSDS 2012 gave the following.

i. Producer is the role played by those persons, or client systems, which provide the information to be preserved.
ii. Management is the role played by those who set overall OAIS policy as one component in a broader policy domain, for example as part of a larger organization. In other words, Management control of the OAIS is only one of Management's responsibilities. Management is not involved in day-to-day Archive operations. The responsibility of managing the OAIS on a day-to-day basis is included within the OAIS in an administrative functional entity.
iii. Consumer is the role played by those persons, or client systems, that interact with OAIS services to find and acquire preserved information of interest. A special class of Consumers is the Designated Community. The Designated Community is the set of Consumers who should be able to understand the preserved information. A given individual or system may act in the role of both a Consumer and a Producer.

OAIS High-level external interactions

The following present a high-level view of the interaction between the entities identified in the OAIS environment. Figure 3 is a data flow diagram that represents the operational OAIS Archive external data flows. This diagram concentrates on the flow of information among Producers, Consumers and the OAIS and does not include flows that involve Management.

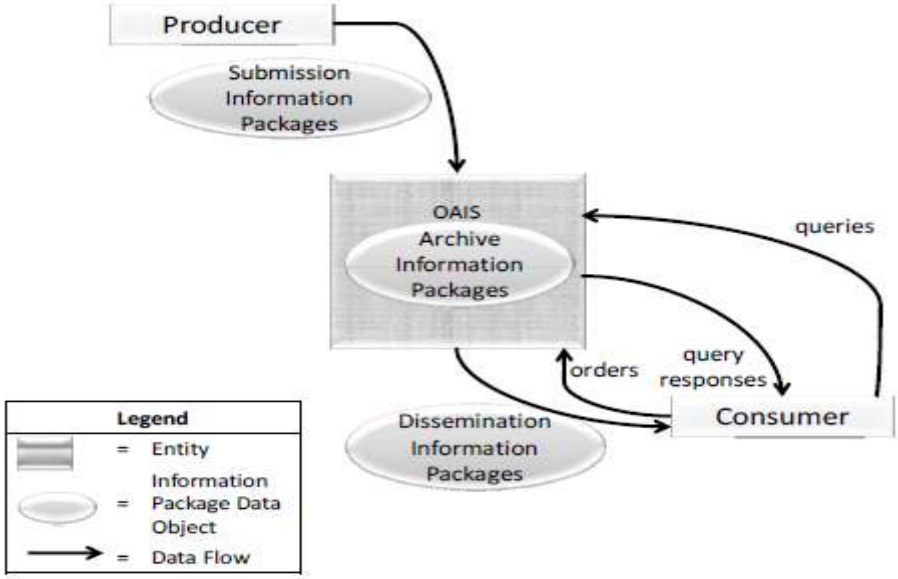

Figure 2.6.2: OAIS Archive External Data
Source: Consultative Committee for Space Data Systems (CCSDS) (2012)

2.7 Management interaction

Management provides the OAIS with its charter and scope. The charter may be developed by the Archive, but it is important that Management formally endorse Archive activities.

The scope determines the breadth of both the Producer and Consumer groups served by the Archive.

The committee gave some examples of typical interactions between the OAIS and Management which include:

i. Management is often the primary source of funding for an OAIS and may provide guidelines for resource utilization (personnel, equipment, facilities).

ii. Management will generally conduct some regular review process to evaluate the
OAIS performance and progress toward Long term goals, and assess the risks to which the OAIS and its holdings are exposed.
iii. Management determines, or at least endorses, pricing policies, as applicable, for OAIS services.
iv. Management participates in conflict resolution involving Producers, Consumers and OAIS internal administration.

Effective Management should also provide support for the OAIS by establishing procedures that assure OAIS utilization within its sphere of influence. For example, management policies should require that all funded activities within its sphere of influence submit data products to the Archive and also adhere to Archive standards and procedures.

III. METHODOLOGY

The aim of the study is to design a framework for digital archiving documents of Ministries. Therefore, the objective of the design is to show a step by step explanation of how objects and other graphical representations of the design are related and will be developed. More so, to present the sequence of steps that describes the aspects to be designed.

3.1 Modelling Approach

Models are graphical or symbolic representation, concept or relationship that explains and describes the system to be developed. For the purpose of this study, Unified Modelling Language was adopted (UML). UML is a general-purpose, developmental, modelling language in the field of software development. It consists of behavioural diagram. Behaviour diagrams emphasize what must happen in the system being modelled. In this study, the behavioural diagrams used are Use Case and Activity Diagram

IV. EXPERIMENT AND RESULT

4.1 Process Model Design

The framework depicts how entities interact at different levels of data structure. The essence of the model is to also explain logic which drives functions between integrated modules that makes up the system. The entities have shown a step by step explanation on activities within the ministry. These entities include; archival process, retrieval process and the context diagram.

Figure 4.1.1 presents the steps of the archiving process which ranges from authentication of files to the final implementation. This stage involves processes such as authenticating submitted file, scanning, uploading, saving by the system as well as retrieving the file when needed.

Figure 4.1.2 describes the retrieval process. This explains from the moment staff requests for information from the system, to the system authenticating and retrieving the requested file.

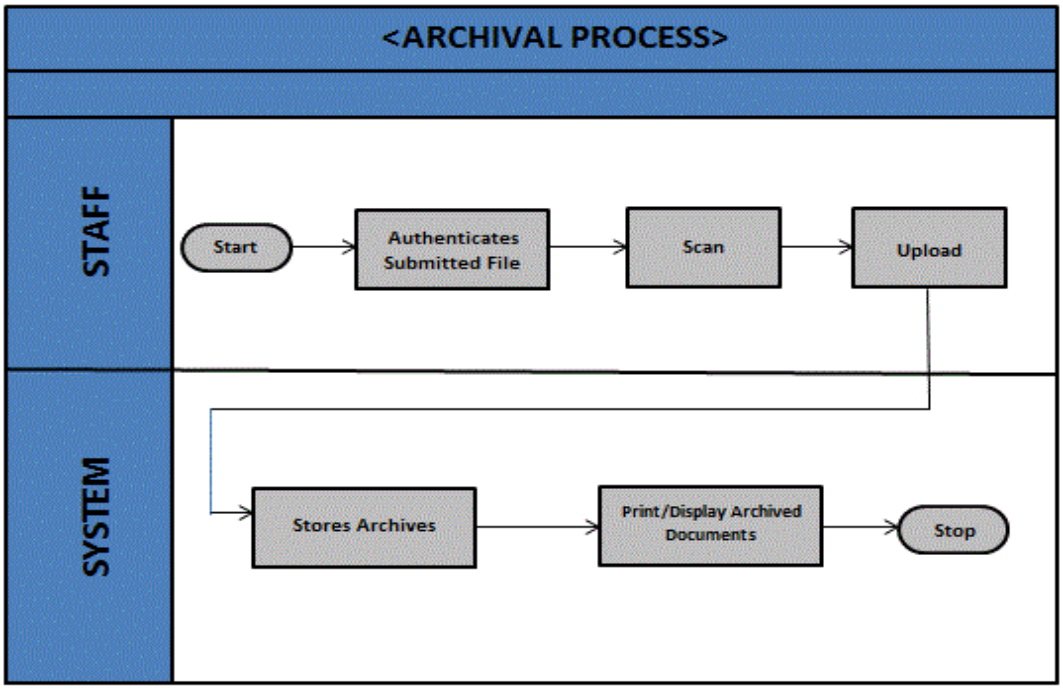

Figure 4.1: Process Model Showing Archival Process

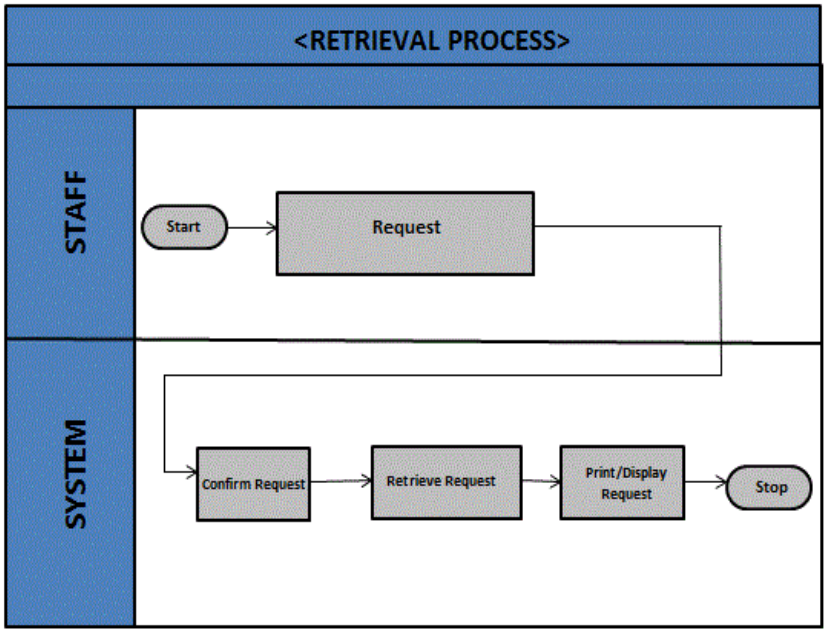

Figure 4.1.2 : Process Model Showing Retrieval Process

4.2 Use Cases Design

The use case diagrams like other diagrams presents sections and various activities users can undergo on the system. Use cases can be in high level or elaborated form. The high level gives a snap short of the whole activities while the elaborated form comprehensive and extensive description of the activities. With regards to this design, the high level form alone was used because of the nature of the design. The use case diagrams are shown in Figure 4.2.1 and 4.2.2.

In Figure 4.2.1, the staff and the system are considered as the actors. They trigger and end processes. They are usually positioned outside the boundary of the main system. The activities are presented within the boundary. The Use cases or activities involved; authenticates submitted files, scan, upload, stores archives and retrieve/prints documents.

The staff will first authenticate the files to be archived from the ministry, he then scan the file in pdf format and upload the file using the application. The system will then take over from there, it"s responsible for saving the uploaded file and retrieving same as the need arise.

In figure 4.2.2, the staff and the system are still the actors. Here, the staff sends a request, the system then confirms the request, retrieves the requested information and the finally prints/displays the requested file. The staff at this point gets the requested file.

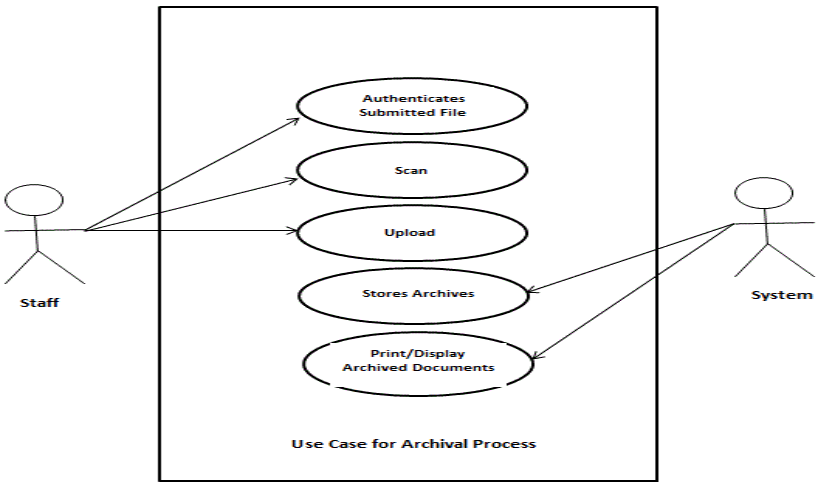

Figure 4.2.1. Use case diagram showing Archival Process

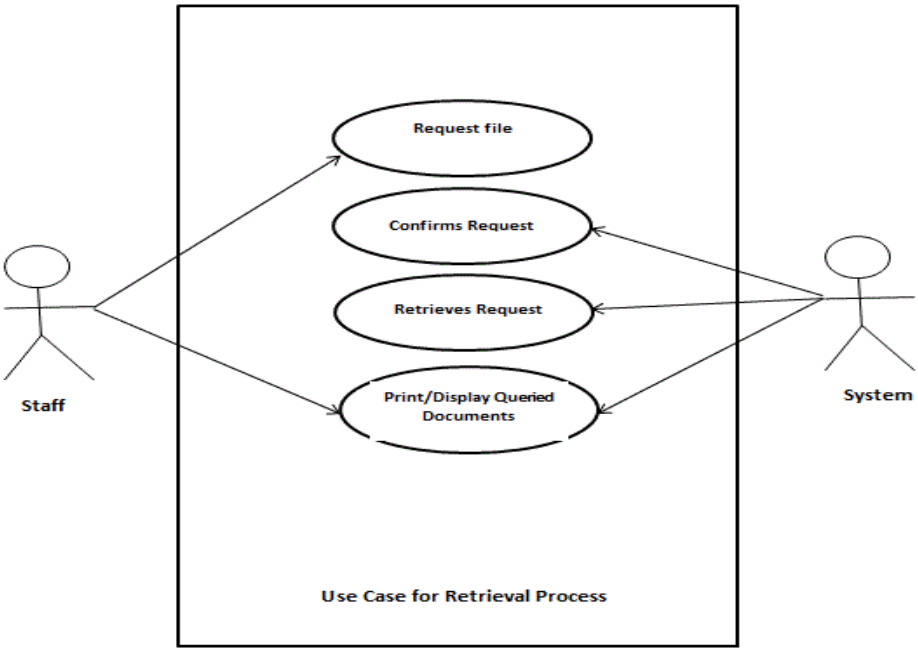

Figure 4.2.2. Use case diagram showing Retrieval Process

4.3 Context Diagram

Context diagrams show and present the system boundaries as well as external entities that interacts with the system. In the mother system, major information flows between entities. Figure 4.3.1 shows the context diagram. It summarizes all the processes and activities in the system

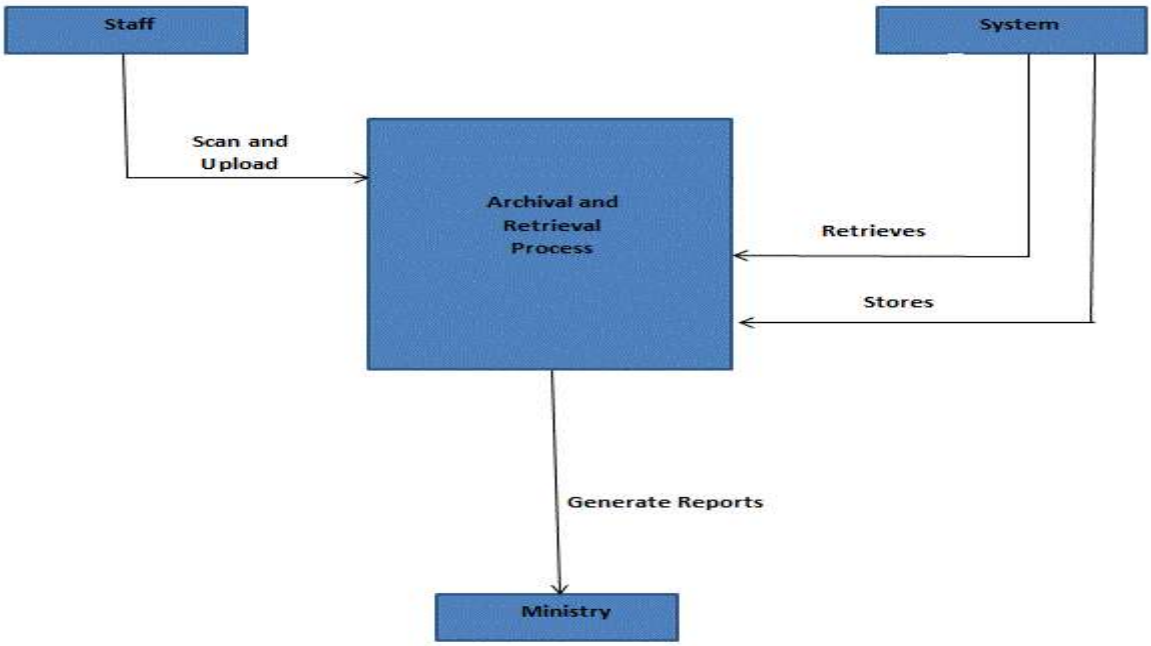

Figure 4.3.1. A Context Diagram Showing Archival/Retrieval Process

V. CONCLUSION

Conclusion

The design if fully implemented will offer alternative to the traditional method currently used by the Ministries. The design will improve the existing system and eliminate uncertainties that will bring a halt to the smooth operation of the company. The framework‟s flexibility makes it easier to work in other places where long term archival preservation is required. The framework will handle various activities that ranges from

scanning, naming, uploading and retrieval of archived documents.

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